

image with a high brightness level sustained for a long period of time, and which is lightweight and easy to manufacture.

Further objects, features and advantages of the present invention will become apparent from the following description of the preferred embodiments with reference to the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic plan view showing a basic construction of an image forming apparatus according to a first embodiment of the present invention;

Figs. 2A, 2B and 2C are schematic sectional views taken along lines A-A', B-B' and C-C' in Fig. 1;

Figs. 3A and 3B are schematic views of a surface conductive type electron emitting device used in the present invention;

Figs. 4A and 4B are graphs showing waveforms of pulse voltages applied for forming an electron emitting portion of the surface conductive type electron emitting device used in the present invention;

Fig. 5 is a graph showing a typical electric characteristic of the surface conductive type electron emitting device used in the present invention;

Figs. 6A and 6B are schematic views each showing a makeup of an image forming member used in the image forming apparatus of the present invention;

5 Figs. 7A to 7F are schematic plan views showing a part of successive manufacturing steps of the image forming apparatus according to a first embodiment of the invention;

10 Fig. 8 is a schematic plan view showing a basic construction of an image forming apparatus according to a second embodiment of the present invention;

15 Fig. 9 is a schematic sectional view taken along line A-A' in Fig. 1, showing an image forming apparatus according to a third embodiment of the present invention;

Fig. 10 is a schematic plan view showing a basic construction of an image forming apparatus according to a fifth embodiment of the present invention;

Fig. 11 is a partial schematic sectional view taken along line D-D' in Fig. 10;

20 Fig. 12 is a schematic plan view showing one example of a conventional surface conductive type electron emitting device;

Fig. 13 is a schematic sectional view showing one example of a conventional FE type electron emitting device;

Fig. 14 is a schematic sectional view showing one example of a conventional MIM type electron emitting device;

25 Fig. 15 is a schematic sectional view showing a getter

and the surroundings thereof in a conventional image forming apparatus;

Fig. 16 is a schematic sectional view showing a spacer support and the surroundings thereof in a conventional image forming apparatus;

Fig. 17 is a schematic perspective view of one conventional image forming apparatus;

Fig. 18 is a schematic view for explaining a problem to be overcome by the present invention;

Fig. 19 is another schematic view for explaining a problem to be overcome by the present invention;

Fig. 20 is a schematic perspective view of another conventional image forming apparatus;

Fig. 21 is a schematic perspective view of an image forming apparatus according to a sixth embodiment of the present invention;

Figs. 22A and 22B are each a schematic view of an example of a face plate in the image forming apparatus of the present invention;

Fig. 23 is a schematic perspective view of the image forming apparatus according to the sixth embodiment of the present invention;

Fig. 24 is a schematic sectional view, taken along line D-D' in Fig. 23, of the image forming apparatus according to the sixth embodiment of the present invention;

Fig. 25 is a schematic sectional view of one modification of the image forming apparatus to which the present invention is applicable;

5 Fig. 26A is a schematic plan view of an image forming apparatus according to a seventh embodiment of the present invention, and Figs. 26B and 26C are schematic sectional views taken along lines A-A' and B-B' in Fig. 26A;

10 Fig. 27A is a schematic plan view of an image forming apparatus according to an eighth embodiment of the present invention, and Figs. 27B and 27C are schematic sectional views taken along lines A-A' and B-B' in Fig. 27A;

15 Fig. 28A is a schematic plan view of an image forming apparatus according to a ninth embodiment of the present invention, and Figs. 28B and 28C are schematic sectional views taken along lines A-A' and B-B' in Fig. 28A;

Figs. 29A and 29B are schematic views showing examples of a face plate in the image forming apparatus according to the seventh embodiment of the present invention;

20 Fig. 30A is a schematic plan view of an image forming apparatus according to a tenth embodiment of the present invention, and Figs. 30B and 30C are schematic sectional views taken along lines A-A' and B-B' in Fig. 30A;

25 Fig. 31 is a schematic view showing one example of a face plate in the image forming apparatus according to the tenth embodiment of the present invention; and

Fig. 32 is a schematic view of one example of an image forming member in the image forming apparatus of the present invention.

5

DESCRIPTION OF THE PREFERRED EMBODIMENTS

One form for carrying out the present invention will be described below in detail with reference to the drawings.

10 Fig. 10 is a plan view schematically showing one example of a construction of an image forming apparatus (airtight container) according to the present invention, as viewed from above a face plate 11, with a lower portion of the face plate 11 omitted for the sake of explanation. An inner space of an airtight container 100 is maintained in a depressurized condition. Though depending on the type of an electron emitting device used, a vacuum level in the inner space of the airtight container 100 is preferably under pressure lower than 10^{-6} Pa.

15 Figs. 2A, 2B and 2C are schematic sectional views respectively taken along lines A-A', B-B' and C-C' in Fig. 10 (or 1). Fig. 11 is a partial schematic sectional view taken along line D-D' in Fig. 10.

20 Referring to Figs. 10, 11, and 2A to 2C, numeral 1 denotes a rear plate (first substrate). The rear plate 25 (first substrate) 1 has a principal surface on which an